

Remarks

The Applicants have amended the Specification to place it into more contemporary form. No new matter has been added.

The Applicants have added new Claims 8 – 25. New Claims 8 – 25 are provided in three sets comprising Claims 8 – 13, 14 – 19 and 20 – 25. The respective dependent claims are similar to original Claims 2 – 6, respectively. Support for new Claim 8 may be found in Example 1, as well as other locations in the Specification. Support for new Claim 14 may be found in Example 6 of the Applicants' Specification and elsewhere. Similarly, support for new Claim 20 may be found in Example 7 of the Applicants' Specification and elsewhere. Entry in the official file and consideration on the merits is respectfully requested.

The Applicants note the objection to Claim 1. The objection is now moot in view of the amendment of Claim 1 to include “comprising” as helpfully suggested by the Examiner. Claims 8, 14 and 20 have also been drawn with the objection in mind.

Claim 7 stands rejected under 35 USC. §112. That rejection is now moot in view of the amendments to Claim 7 as helpfully suggested by the Examiner.

Claims 1 – 7 stand rejected under 35 USC. §103 over JP'446. The Applicants respectfully submit that the §103 rejection is inapplicable. Detailed reasons are set forth below.

The Applicants disclose a process for recovering an optically active diacyltartaric acid from a salt of an amine and the optically active diacyltartaric acid in an acid aqueous solution in which an optically active diacyltartaric acid is added beforehand. The Applicants agree the Examiner's frank acknowledgment that both of JP '446 and JP '236 are silent with respect to the optically active diacyltartaric acid being added beforehand in the acid aqueous solution.

The purpose of adding the optically active diacyltartaric acid in the acid aqueous solution beforehand is not to adjust the reaction condition (such as pH concentration, time, speed). The process is for industrially recovering an optically active diacyltartaric acid capable of being easily used in recycling. More particularly, the process solves the problems of the prior art disclosed in line 8 on page 6 to line 9 on page 7 in the Applicants' Specification. In the case that a salt of an optically active diacyltartaric acid is directly added into the stirred acid aqueous solution, the optically active diacyltartaric acid is precipitated, due to salt exchange, all at once to aggregate a block. Since the optically active diacyltartaric acid salt is also contained in the block, smooth salt exchange does not take place.

Comparative Example 1 is an example that a salt of an optically active diacyltartaric acid is directly added into the stirred acid aqueous solution. In this case, "lumps stuck to the wall of the flask and did not form crystals," and "furthermore, the remaining diastereomer salt was added, taking about 2 hours, and the mixture was stirred overnight at room temperature. No crystalline di-p-toluoyl-D-tartaric acid was obtained." Such an optically active diacyltartaric acid will not be suitable for recycling.

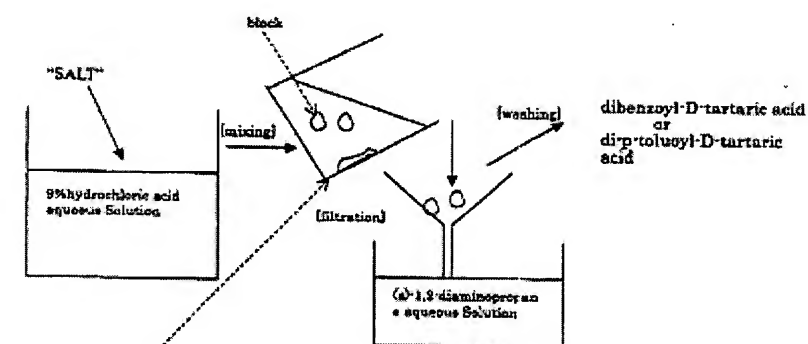
On the contrary, for example, in Example 1, it is shown that the di-p-toluoyl-D-tartaric acid precipitated due to salt exchange was crystallized. Furthermore, the recovery rate is high (98%). Such an optically active diacyltartaric acid is suitable for recycling. The state of the recovered optically active diacyltartaric acid is good in slurry properties, and is also good in filtration properties (see lines 8 to 20 in the Specification on page 8). Furthermore, the recovery rate of the optically active diacyltartaric acid is high.

On the other hand, the cited prior art only discloses the process that a salt of an optically active diacyltartaric acid is directly added into the stirred acid aqueous solution.

Neither reference discloses adding the optically active diacyltartaric acid beforehand in the acid aqueous solution, the state of slurry of the recovered optically active diacyltartaric acid, the quality of the recovered optical active diacyltartaric acid, nor recycling the recovered optical active diacyltartaric acid. According to the Applicants' study, there are the above-mentioned problems in both of the methods of the prior art (see line 25 on page 1 to line 4 on page 2 in the Specification).

The Applicants enclose illustrations of the methods of the prior art and the claimed subject matter. The methods of Example 5 of JP '446 and Example 5 of JP '236:

"SALT" is a salt of (S)-1,2-diaminopropane-dibenzoyl-D-tartaric acid in the case of JP '446, and is a salt of (S)-1,2-diaminopropane-di-p-toluoyl-D-tartaric acid in the case of JP '236.



"Lump stuck to the wall."

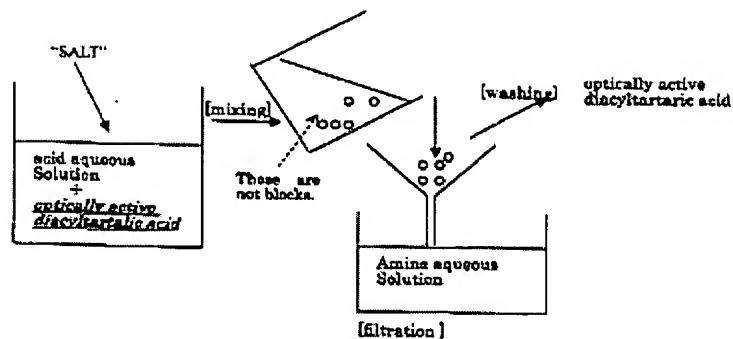
It must be scraped together to recover it.

If this were applied in a commercial process, recovery of lumps would be difficult.

Even if lumps and blocks are recovered, they would not be suitable for recycling.

The claimed methods:

"SALT" is a salt of an amine and an optically active diacyltartaric acid.



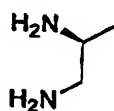
The Applicants therefore respectfully submit that both of JP '446 and JP '236 are inapplicable to all of Claims 1 – 7. In particular, neither reference teaches or suggests the subject matter of those claims. Withdrawal of both rejections is respectfully requested.

The Applicants also respectfully submit that JP'446 is inapplicable to the newly submitted claims as well. The Applicants first note that JP'446 is the equivalent of JP 2712669 cited on page 1 of the Applicants' Specification. The Applicants have already established the problems associated with JP'669/JP'446 inasmuch as the diacyltartaric acid recovered by the solid-liquid separation of JP'669/446 is highly likely to be aggregated as a block, thereby necessitating a subsequent grinding step before recycling can occur. Also, when the aggregation occurs, it requires a long reaction time for the salt of an amine and an optically active diacyltartaric acid to be formed. Thus, the process disclosed in JP'669/446 is not practical for industrial use.

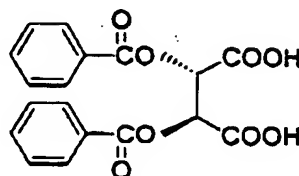
The following is a comparison of JP '446, JP '236, Claim 1, Examples 1, 6 and 7 from the Applicants' Specification,

JP '446	JP '236	Claim1	Example 1	Example 6	Example 7
			Racemic amine + DCT acid + Acid solution	Racemic amine + DCT acid + H ₂ O	
↓ heat & cool, precip(optical resolution)					
Salt of amine + H ₂ O			Salt of amine + H ₂ O		
↓ heat & cool, precip(recrystallization)					
Salt of amine + Acid Solution	Salt of amine + Acid Solution	Salt of amine + Acid Solution + DCT acid	Salt of amine + Acid Solution + DCT acid	Salt of amine + Acid Solution + DCT acid	Salt of amine + Acid Solution + DCT acid
↓ precip					
DCT acid	DCT acid	DCT acid	DCT acid	DCT acid	DCT acid

(1) Example 5 of JP '446



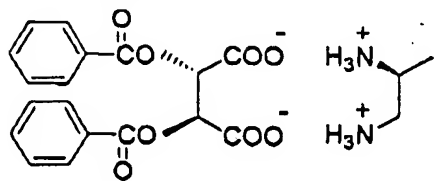
Amine: (S)-1,2-diaminopropane



DCT acid: dibenzoyl-D-tartaric acid

dibenzoyl-D-tartaric acid

Salt of amine : Salt of (S)-1,2-diaminopropane and dibenzoyl-D-tartaric acid = (S)-1,2-diaminopropane • dibenzoyl-D-tartaric acid



Salt of amine

(2) Example 5 of JP '236

Amine : (S)-1,2-diaminopropane

DCT acid : di-p-toluoyl-D-tartaric acid

Salt of amine : Salt of (S)-1,2-diaminopropane and di-p-toluoyl-D-tartaric acid:
= (S)-1,2-diaminopropane • di-p-toluoyl-D-tartaric acid

(3) Claim 1 of the present invention

Amine : amine

DCT acid : optically active diacyltartaric acid

Salt of amine : Salt of an amine and the optically active diacyltartaric acid

(4) Example 1 in the present specification

Racemic amine : 1,2-diaminopropane

DCT acid : di-p-toluoyl-D-tartaric acid

Salt of amine (Diastereomer salt) :

Salt of optically active 1,2-diaminopropane and di-p-toluoyl-D-tartaric acid
= Optically active 1,2-diaminopropane • di-p-toluoyl-D-tartaric acid

(5) Example 6 in the present specification

Racemic amine: 1,2-diaminopropane

DCT acid: dibenzoyl-L-tartaric acid

Salt of amine (Diastereomer salt) :

= Salt of optically active 1,2-diaminopropane and dibenzoyl-L-tartaric acid
= Optically active 1,2-diaminopropane • dibenzoyl-L-tartaric acid

(6) Example 7 in the present specification

DCT acid: dianisoyl-L-tartaric acid

Salt of amine :

Salt of optically active aminopentanenitrile and dianisoyl -L-tartaric acid
= Optically active aminopentanenitrile • dianisoyl -L-tartaric acid

In any event, the Applicants respectfully submit that JP'446 is different from the Applicants' Claim 8, for example. It should be noted that JP'446 discloses contacting a salt of an amino acid and a diacyltartaric acid with water, followed by heating and cooling to precipitate the salt of the amine and the acid. Then, an aqueous acid solution is added to the salt to precipitate the diacyltartaric acid. This is followed by the addition of a basic aqueous solution and distillation to isolate the amine.

This is sharply different from Claim 8, which does not start with a salt of the amine and the diacyltartaric acid. Instead, Claim 8 contacts amine, diacyltartaric acid and an aqueous acid solution. A diastereomer salt of the amine and the diacyltartaric acid is precipitated. Then, the diacyltartaric acid in an aqueous acid solution is added to precipitate the diacyltartaric acid. This is neither taught nor suggested by JP'446 and is in no way a reversal of the order of steps as suggested in the rejection. This is demonstrated in Exhibit A.

There are also serious differences between Claims 14 and 20, with respect to JP'446 as well. The Applicants enclose Exhibits B and C to illustrate the difference. Again, the Applicants in Claim 14 do not begin by contacting a salt of an amine and a diacyltartaric acid plus water, instead, the Applicants start with the amine, the diacyltartaric acid and water. In the case of Claim 14, the solution of amine diacyltartaric acid and water is followed by a precipitation step which forms a salt of the amine and the diacyltartaric acid. This is followed by the addition of the diacyltartaric acid and an aqueous acid solution to precipitate the diacyltartaric acid. In Claim 20, salt of an amine and the optically active tartaric acid was added by dividing. Second addition of salt was after the dianisoyl-L-tartaric acid precipitated due to salt exchange was crystallized. Again, this is no way a reversal of the steps.

In light of the foregoing, the Applicants respectfully submit that the entire application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,



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Exhibit A

JP '446

Claim 8

JP '236

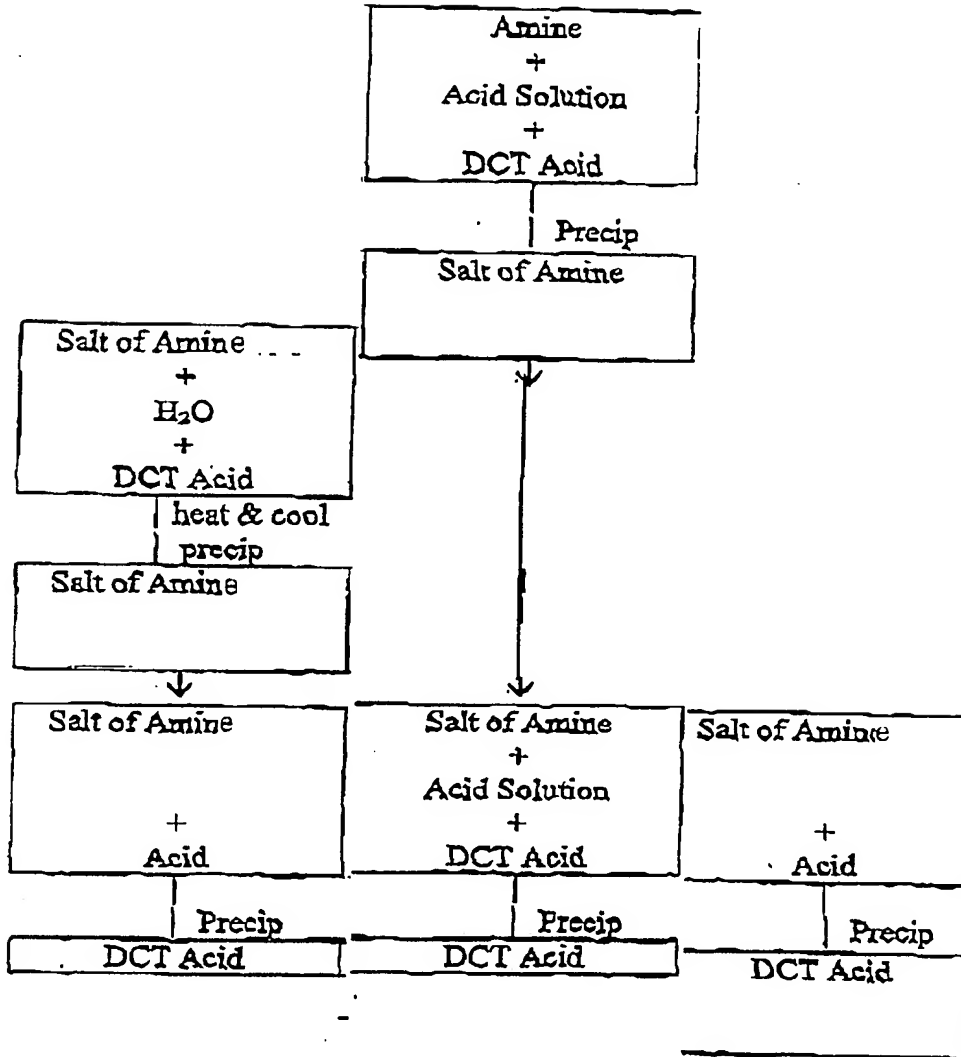


Exhibit B

JP '446

Claim 14

JP '236

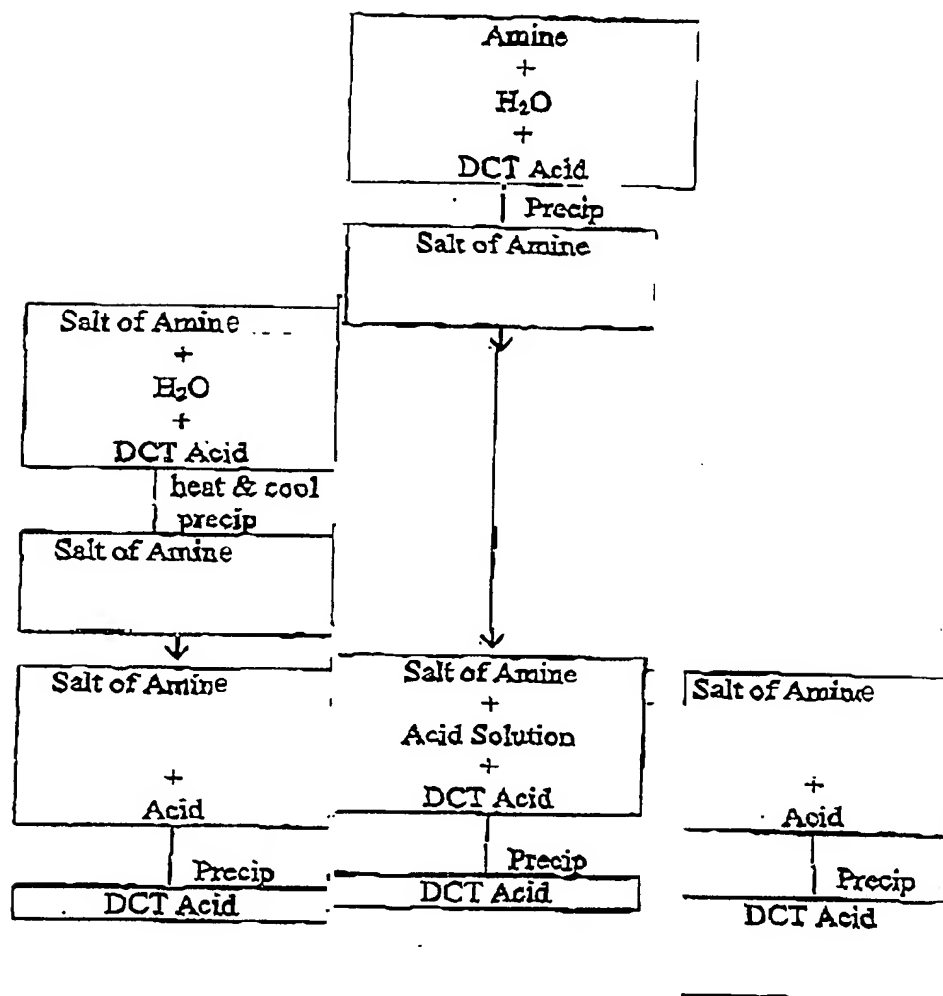
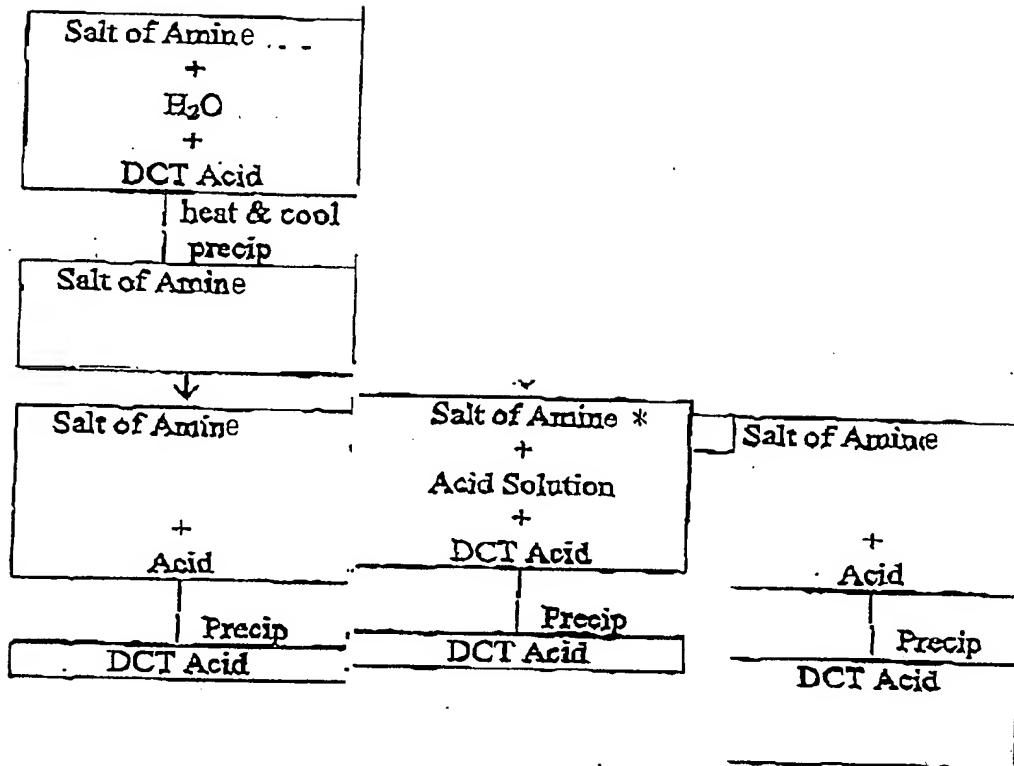


Exhibit C

JP '446

Claim 20

JP '236



* Salt of amine was added by dividing. Second addition of salt was added the dianisoyl-L-tartaric acid precipitated due to salt exchange was crystallized